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present these data as a fully illustrated comic poster, showing the interaction between and among these two technologies and changes in human biology over time

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Myokine secretion during low-intensity physical activity: dose response of interleukin 6 to walking duration

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Chronic low-grade inflammation is rising worldwide, fueling increasing incidence of non-communicable diseases. While the sources of chronic inflammation are varied, lack of physical activity is a key risk factor. During physical activity, contracting muscles secrete a variety of immunomodulatory and metabolic factors called myokines that reduce chronic inflammation. Foremost among these is interleukin 6 (IL-6), which increases fatty acid mobilization and stimulates anti-inflammatory cytokine release. Since IL-6 release has traditionally been linked with muscle glycogen depletion, the majority of previous studies have focused on modern high intensity exercise contexts such as marathon running. Few studies have assessed IL-6 secretion during evolutionarily normal contexts such as walking and the majority of those studies use relatively short exercise protocols (<1 hour) and high intensities (50-60% $\text{VO}_{2\text{max}}$). To test the hypothesis that IL-6 release occurs during evolutionarily normal contexts like long distance walking, we performed a dose response experiment to test the effect of walking duration on IL-6 secretion. 13 participants completed four moderate intensity walking trials (55% HR_{max}) for 30min, 1hr, 2hrs, and 3hrs with intervening washout periods of at least one week. Capillary blood samples were taken before and after each exercise bout to evaluate changes in IL-6. Using a linear mixed effects model, we found that IL-6 levels increased significantly only during the two- and three-hour walking trials. These results demonstrate that myokine secretion occurs even during low intensity physical activities, supporting the hypothesis that decreased time walking in modern environments is a mismatch that contributes to chronic inflammation.

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Does hair length or number explain variation in primate hair microbiome diversity?

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Microbiome diversity plays a critical role in host biology and is influenced by both environmental and evolutionary factors. For nonhuman primate hair, microbiome diversity is associated with several factors including sex, environmental conditions, and species identity. In addition, human hair microbiome studies suggest that hair length and number may explain variation in hair microbiome diversity, but this has been unexplored for other primate species. Therefore, in this study, we investigated the strength of hair number and hair length as predictors of primate hair microbiome diversity using a comparative dataset of 12 species sampled across several body regions. We used linear models to test the association between alpha diversity and several predictors including hair length, hair number (as a proxy for density), host species identity, sex, housing institution, and body site. We quantified the strength of each predictor using the sum of AICc weights. We found that both hair length and number were weak predictors of alpha diversity when accounting for other factors. Host species identity was the strongest predictor. We suggest that primate hair microbiome diversity is explained by other factors related to primate host biology, such as sweat or scent gland morphology and density. In addition, our results indicate that a relatively small number of hairs (averaging 35 hairs in our study) can accurately quantify primate hair microbial communities.

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Life among the trees? Sir Arthur Keith's 'plantigrade stage' in the *Homo habilis* hand (OH 7) and foot (OH 8) remains

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Building upon the insights of Lamarck and Darwin, Sir Arthur Keith proposed three stages in hominoid evolution, involving an initial shift from forelimbs specialised for an arboreal environment ('hylobatian') to 'equalised' limbs adapted to both arboreal and terrestrial settings ('trog-lodytian'), and finally specialisation of the lower limbs for terrestrialism ('plantigrade'). In the absence of 'transitional' fossils, Keith recognised that human gait and posture is a culmination

of a series of evolutionary phases acting on the orthograde ape body plan. Here, we shed light on the 'plantigrade stage' of *Homo habilis*, focusing on functional signals derived from the internal bone structure of the hand (OH 7) and foot (OH 8). Cortical thickness mapping and cross-sectional geometry (CSG) show that the OH 7 manual phalanges are most similar to non-human apes, the scaphoid's internal cortical and trabecular structure shows an intermediate pattern, while the external shapes of the carpals are human-like. Despite primitive features of the OH 8 talus shape, both talar trabecular distribution and CSG across the metatarsals suggest human-like loading of the ankle and forefoot. Internal structure of the metatarsals indicates the OH 8 foot belongs to an adult individual and thus OH 8 and OH 7 should be attributed to different individuals. The functional signals of the fingers indicate powerful grasping while the foot suggests human-like load distributions. Despite their discovery only ~40 years after Keith's proposal, the *H. habilis* fossils continue to offer novel information about the diversity of 'plantigrade' and 'trog-lodytian' behaviours in Pliocene-Pleistocene hominins.

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Differential gene expression between the proximal and distal developing calcaneus: Implications for primate evolution

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Calcaneus morphological changes are important to our understanding of human and non-human primate locomotor evolution, including increased size and cross-sectional area of the calcaneal tuberosity in humans and distal end elongation in tarsiers and galagos. The calcaneus is the only tarsal to form a growth plate and associated secondary ossification center, which is located at the proximal end of the calcaneal tuberosity. Thus, distal elongation likely occurs independent of the growth plate and suggests at least two independent development modules define the calcaneus. While calcaneus morphology and evolution is frequently discussed, little is known about the genes underlying the development and morphology of this bone and its single growth plate. To address this deficiency, we used RNA sequencing to determine differentially expressed genes (DEGs) between the proximal (growth plate forming) and distal (non-growth plate forming) ends of the calcaneus in 0, 4, and 9 day old mice. On the proximal end, 27 DEG were expressed

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in at least 2 of the 3 ages. Gene ontology (GO) analysis found these to be associated with embryonic development and the retinoic acid signaling pathway. For the distal end, 148 DEGs were similarly identified and were surprisingly associated with functions related to muscle development, ion channels, and actin binding. However, genes known to affect skeletal development including *Sall1* and *Hoxa13* were also differentially expressed. This analysis identifies potential genetic targets with downstream morphological effects that can be targeted by natural selection to produce region-specific evolutionary changes.

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A Preliminary Investigation into the Effects of *Lucilia sericata* (Meigen) Blow Fly Larval Feeding on Sharp Force Trauma (SFT) Wound Patterns in Decomposing Bones of *Sus scrofa domestica*

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An important aspect of forensic anthropological investigations involves the analysis of skeletal trauma as it can provide valuable information regarding the cause and manner of death. Research on Sharp Force Trauma (SFT) on soft and skeletal tissue typically applies a variety of analytical microscopic methods to explore trauma variation. Thus far, minimal research has integrated a forensic entomology approach with forensic anthropology. This study aims to bridge that gap by considering anthropological and entomological effects in examining SFT.

Using Scanning Electron Microscopy (SEM), this study examined the relationship between *Lucilia sericata* blow fly larval feeding and the nature of SFT an individual may encounter in a forensic case. This research observed two types of traumatic injuries in ribs using a porcine model (n=45). The SFT observed included cutmarks caused by a saw blade and punctures caused by a flathead screwdriver. Based on the SEM imaging results, blow fly larval feeding had an effect on bone morphology in sites of SFT after 24, 48, and 72 hours of decomposition. More specifically, bones with SFT lost integrity of the periosteum and trabecular bone structure, particularly the spacing of the trabecular bone after larval feeding. These results demonstrate a need to further explore this interdisciplinary research, as insect feeding may have an effect on trauma or interpretation of pathological conditions more broadly.

Medicolegal Death Investigation: Medical Examiners/Coroners, Forensic Pathology, and Collaboration with Forensic Anthropology

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Medical Examiners and Coroners are responsible for the medicolegal investigation of sudden, unexpected, unexplained, or violent deaths. Unexpected discovery of skeletal remains requires investigation, and examination of the remains by a forensic pathologist (Medical Examiner) is necessary, usually in conjunction with a forensic anthropologist. A qualified forensic anthropologist can make prompt assessment for critical initial considerations, such as human vs. non-human, and contemporary (forensic) vs. archeological/historical. Once skeletal remains are determined to be of forensic interest, the forensic anthropologist may be asked to undertake examinations to: generate a biological profile leading to tentative identification; estimate the postmortem interval; analyze for trauma; and/or analyze tool marks present on the skeletal elements.

The resolution of medicolegal death investigations is a complex process requiring expertise of the forensic pathologist who works with law enforcement, death investigators, and other forensic scientists. This presentation will provide an overview of medicolegal death investigations with a particular focus on the Washoe County Regional Medical Examiner's Office (WCRMEO). This office regularly consults with a forensic anthropologist who conducts on average 15 cases per year. While highlighting the investigation process, various case studies will be presented that demonstrate the utility of forensic anthropology. These include differentiating among multiple types of skeletal trauma present in a single case, identifying blunt trauma in the presence of severe thermal damage, determining the type/class of implement used in a case of decapitation, and resolving commingled cases serving to identify additional missing decedents.

No funding was received for this project.

Scaling of femoral and tibial cross-sectional properties with body size in prosimian primates

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Hindlimb bone cross-sectional geometric properties (CSP) differ according to locomotion among strepsirrhine primates, a group that exhibits large

variation in body size. However, the potential influences of body size on CSP are less well understood. We examined the relationships between body size and CSP of the femur (n=91) and tibia (n=75) in a sample of 28 species of prosimians that use leaping and quadrupedal modes of locomotion. We collected micro-CT scans of each bone, virtually reoriented the scans, and obtained midshaft slices. The following midshaft CSP were calculated: polar section modulus (an estimate of bending strength), cortical area (an estimate of compressive strength), and polar second moment of area (an estimate of torsional strength). CSP were ln-transformed and regressed on ln-body mass to test scaling hypotheses; analyses of variance were conducted on scaled CSP to compare small- and large-bodied species (i.e., those <1 kg vs >1 kg); and the relationships between femoral and tibial CSP were assessed using correlations. Femoral and tibial CSP scaled isometrically or with slight positive allometry. Small-bodied species tend to have significantly stronger/more rigid femora relative to size than large-bodied species, and this trend is amplified within the leaping taxa; this pattern was less clear in tibial comparisons. Correlations between femoral and tibial CSP were significant, but no clear size-related patterns emerged. Our results suggest that intralimb patterns of CSP may relate to functional differences in postural and locomotor kinematics between small- and large-bodied leapers.

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Comparing oral pathology in the Imperial Roman period and Late Antiquity in Dyrrachium/Dyrrachion (modern-day Albania)

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Sociopolitical conditions present in different historical periods may influence the health of communities differently. The Imperial Roman period (I-IV AD) and Late Antiquity (IV-VII AD) were periods when historical events and factors changed the organization of societies and the lifestyle of individuals. Dyrrachium/Dyrrachion (modern-day Durrës) was the most prosperous city in Illyria (ancient Albania). Historical sources and archaeological remains indicate how historical changes impacted the city's political origination and social life. However, we do not have information about how social-political changes were reflected in health and lifestyle. We test the hypothesis that oral pathologies deteriorate from the Roman period to Late Antiquity, a transitional period associated with conflicts and